



**Via Electronic Mail and Regular Mail**

August 4, 2015

Jonathan Bishop, Chief Deputy Director  
State Water Resources Control Board  
1001 I Street  
Sacramento, CA 95814  
[Jonathan.Bishop@waterboards.ca.gov](mailto:Jonathan.Bishop@waterboards.ca.gov)

Steven R. Bohlen, State Oil & Gas Supervisor  
Department of Conservation, Division of Oil, Gas & Geothermal Resources  
801 K Street  
Sacramento, CA 95814  
[Steven.Bohlen@conservation.ca.gov](mailto:Steven.Bohlen@conservation.ca.gov)

**Re: Confirmation of Elk Hills Aquifer Exemption**

Dear Mr. Bishop and Dr. Bohlen:

We have received your letter dated July 30, 2015. The letter is inaccurate or misleading in certain material respects, in that it fails to reflect that

1. No additional geologic or technical information has been provided to you since all state agency representatives agreed at our May 1 meeting to move forward with the Phase 1 exemption for the southwestern flank of the Elk Hills anticline.
2. The Well Completion Reports you asked us to compile are not available online and the Department of Water Resources warns against expecting a response anytime soon.
3. The potential risk to beneficial use water is purely speculative and has never been considered an actual risk by the multiple state and federal agencies that have reviewed injection at Elk Hills and affirmed the aquifer exemption over the course of three decades. In fact, previous assessments by government agencies have reviewed this specific risk and rejected it.
4. California Resources Corporation (CRC) has extensively evaluated and proposed alternatives to existing injection operations.

**No New Geologic or Technical Data Has Been Provided Since Our May 1 Meeting**

The statement that “additional information” was provided seems to be a carefully worded attempt to rationalize reversing your acknowledgement at our May 1 meeting that you had enough information and were moving forward with a portion of the exemption for the southwestern flank of the Elk Hills anticline. As outlined below in more detail, we had previously suggested that moving forward with a portion of the aquifer exemption should be based on geology, rather than section lines, and you agreed. At your request, we provided a map showing the axis of the anticline on the surface and projection at the base of the Tulare zone in the Elk Hills field (Phase 1 Map). The Phase 1 Map is based on the identical underlying geologic and technical data that was included in the previously submitted materials. We have



been told repeatedly that the submittal was moving ahead only for it to stall, based on the premise that new information was received.

In early 2014, DOGGR District 4 staff informed us that we should update the existing Elk Hills Tulare Aquifer Exemption. At the time we were informed that “everyone knew” the Tulare Formation is exempt but that state agencies wanted us to update the paperwork.

As a result, we prepared and submitted a request for confirmation of the Tulare Aquifer Exemption dated September 14, 2014, after obtaining concurrence from the local water agencies and districts. After months of back and forth, including conversations, e-mails, and meetings, we received a copy of a letter sent by the State Water Board (Water Board) to the Division of Oil, Gas and Geothermal Resources (Division) dated February 11, 2015 (February Letter), which asked for more information on a portion of the field but also stated that “Water Boards staff concur with the Exemption Request only for the following areas: All of Sections 32R and 33R in Township 30S, Range 23E; and 1B, 2B, 3B, 4B, 10B, 11B, 12B and 13B in Township 31S, Range 23E.”

On April 28, 2015, the Division and the Water Board sent us a joint letter (April Letter) stating that “the Division is moving forward with an aquifer exemption application to the U.S. Environmental Protection Agency (US EPA) only for the following areas: Sections 32R and 33R, T30S, R23E, and Section 1B, 2B, 3B, 4B, 10B, 11B, 12B and 13B, T31S, R23E, of the Elk Hills Field.”

After we received the February Letter and the April Letter we met with you on May 1, 2015, in Sacramento. During the meeting we jointly agreed to move forward with the submittal of the southwestern flank based on geology, rather than section lines, encompassing the areas south west of the crest of the anticline. You agreed and asked us to submit the Phase 1 Map. After the meeting we sent a letter dated May 13, 2015 that reflected the understanding we reached at the meeting -- in particular, that we would submit the Phase 1 Map to you and you would move forward with the Phase 1 approval.

We submitted the Phase 1 Map on May 26, 2015. As stated above, the Phase 1 Map simply emphasized the crest of the anticline's location and it is based entirely on the identical geologic information previously submitted. This is a very important point because in the July 30, 2015 letter where you reverse your previous position you also ask us for more data. What assurances do we have that the most recent letter you sent, and the process outlined in it, will not be reversed or modified in the future? This uncertainty prevents us from understanding the path forward on Phase 1 and 2 of the Elk Hills aquifer exemption update.

### **The Well Completion Reports Are Not Available Online**

As part of your new data request you asked that we conduct a water supply well survey identifying the location of all water supply wells within certain sections. At your request, we previously conducted a water well survey and submitted information regarding water wells within these sections and included this information on page 22 of the supplemental package. Without acknowledging this information, you have now directed us to a new Department of Water Resources (DWR) website to conduct essentially the same survey. However, if you visit the DWR website it states:

“The law requires the Department of Water Resources to comply with the Information Practices Act of 1977, redacting personal information from the Well Completion Reports before making them public. Since there are about 800,000 reports on file with the Department, it requires a significant effort to redact the personal data from all reports. DWR is in the process of redacting the personal information with the goal of making all Well Completion Reports available online at



no charge within the next year... Please note that requests for Well Completion Reports are numerous and the availability of staff is limited.”

Based on this disclosure, and a phone call we made to DWR, it appears that we need to file a paper request for access and that this will be another lengthy process with no concrete assurance this will lead to approval of our submission.

**The Potential Risk to Beneficial Use Water Is Purely Speculative and Has Been Rejected by Other Agencies**

The Elk Hills Field is a 47,000-acre oil field that was discovered in 1911. In 1912, it became the nation's first Naval Petroleum Reserve. It was owned by the federal government and operated by the U.S. Navy and then the U.S. Department of Energy until Occidental Petroleum purchased it in 1998 after an Act of Congress that transferred all permits and approvals to Occidental. CRC and its predecessor invested over \$11.6 billion in the Elk Hills area in the past 17 years. Elk Hills is the largest producer of natural gas and natural gas liquids in California, and is home to a 550-megawatt natural gas power plant with the capacity to supply electricity to more than 500,000 homes. Depending on activity levels, 2,000 to 5,000 people work at Elk Hills every day. It has operated since discovery with no instance where drinking water supplies have been affected.

In 1981, the federal government decided that the primary method of disposal of produced water would be through injection into the Tulare Formation. This was the disposal method encouraged at the time by all state and federal agencies involved.

In July 1993, the DOE prepared a Supplemental Environmental Impact Statement (1993 Environmental Review). As part of the 1993 Environmental Review, the DOE stated:

In approximately 1983, the NPR -1 Tulare Formation was exempted under the Underground Injection Control (UIC) Program as an underground source of drinking water when the Environmental Protection Agency approved the California Division of Oil and Gas application for primacy pursuant to Section 1425 of the Federal Safe Drinking Water Act (40 CFR Part 147, Subpart F).

In October 1997, the DOE prepared another Supplemental Environmental Impact Statement (1997 Environmental Review). As part of the 1997 Environmental Review, the DOE stated:

The Tulare Zone has been identified by the regulatory authorities as an exempt aquifer that does not have any beneficial uses other than as a potential source for oil-field waterflood operations...

One concern related to the wastewater injection program is the potential impact on off-site groundwater resources used for agriculture. The alluvium of Buena Vista Valley, from which agriculture water production is obtained, is near the south flank of NPR -1, where injection wells are located. **However, recent work performed to support the 1993 SEIS hydrogeologic discussions has shown that the Tulare clay forms a barrier to groundwater migration between the Tulare Zone, where produced water is injected, and the alluvium (see Figure 3.2-5, taken from Milliken (1992)). In addition, Phillips (1992) and Milliken (1992) present water quality and resistivity data indicating that the Amnicola clay acts as an aquiclude separating the Tulare Formation groundwater above and below this clay (see Section 3.4.3 for additional details).** (emphasis added)



In September 1999, the DOE prepared an environmental assessment for Waste Remediation Activities at Elk Hills (1999 Environmental Review). As part of the 1999 Environmental Review, the DOE stated:

The Tulare Formation within the Elk Hills has been designated as an exempt aquifer by the California Division of Oil, Gas and Geothermal Resources (DOGGR) because it is hydrocarbon - producing in the western part of the Reserve (30R) and it contains groundwater with a total dissolved solids content exceeding 3,000 ppm (i.e., it is not reasonably expected to supply a public water supply system).

In February 2000, the CEC prepared an Application for Certification of the Elk Hills Power Project (2000 CEC Review). As part of the 2000 CEC Review, the CEC stated:

As designated by the California Division of Oil, Gas and Geothermal Resources (DOGGR), this formation is an exempt aquifer as a source of drinking water within the boundaries of the Elk Hills and Midway -Sunset oil fields. The current wells are operated under an Underground Injection Control permit issued by DOGGR.

In February 2001, the EPA approved a Class I Nonhazardous Waste Injection Permit for the Elk Hills Power Project (Class I Review). As part of the Class I Review, the EPA stated:

After review of the existing records, EPA has made the determination that the Tulare Formation within the Area of Review is an exempted aquifer. As such, the prohibitions of 40 CFR Sec. 144.12(a) do not apply to the Tulare Formation within the Area of Review. Furthermore, injection will be confined to the intended injection zone and no USDWs will be impacted by the permitted underground injection activities...

Satisfactory evidence such as well logs and drilling records exist that the Tulare clay acts as a barrier to ground water flow and that it will act as a barrier to contain the injection fluids within the Tulare Formation.

DOGGR has also approved over 100 disposal wells injecting into the Tulare Formation over the past three decades with both full public disclosure and approval of the state and federal governments

As the government agencies stated above, and as we have explained in detail in our exemption submittal and supplement, and repeated in our ongoing communications, injection into the Tulare Formation is safe. In particular, we showed on Exhibits 5 and 6 of the supplemental package that the Tulare clay is a continuous confining layer that is at least 200' thick and that the Tulare clay continues, maintaining its character and thickness, out to the Buena Vista Lake basin. Pages 16 and 17 of the original submittal prove that the water quality of the Tulare is poor because the water quality exceeds MCLs and EPA lifetime health advisory limits for various constituents, including lead, selenium, TDS, chloride, sulfate, boron, strontium and sodium. The potential risks you suggest are supported by no data, only conjecture, and have been repeatedly rejected by every agency to review injection at Elk Hills.

We firmly believe that the state needs to honor our longstanding permits on which we have relied on to invest billions of dollars in oil and gas development and integrated wells, pipelines, processing facilities, a power plant and other infrastructure that have benefited Kern County and the entire state through good paying jobs, economic growth, technology, tax revenues and secure oil, natural gas and electricity. Our update of the Elk Hills Tulare aquifer exemption demonstrates that the public and the environment are and will remain fully protected during our injection activities, validates the prior conclusions of numerous state and federal agencies that have repeatedly reviewed and affirmed the exemption, and confirms that there would be no environmental benefit from ceasing injection.





### **CRC Has Extensively Evaluated and Proposed Alternatives**

The statement that “CRC is declining to modify its current injection operations” is grossly inaccurate and offensive to the teams of people we have assigned to evaluate and propose alternatives to certain current operations.

In fact, over 80% of CRC’s current produced water is already used for purposes other than disposal. CRC has long sought to re-claim, re-use or find alternative uses for produced water. Of the roughly 19% of produced water that is disposed, CRC has already filed applications for the following projects:

- Increasing the amount of produced water from the Kern Front field that is reused for beneficial use purposes by at least 40 million barrels of produced water annually, or about 20% of our disposed water; and
- Modifying our waterflood expansion project and injection at the Mt. Poso field to reduce disposal of about 16 million barrels, or about 8% of our current disposed water;

Both of those projects have been submitted to the appropriate agencies and we have already invested in facilities to bring them online as soon as we receive regulatory approvals. State agencies are well aware of these projects and should expedite those permits and yet your letter ignores them even as it accuses us of declining to pursue modifications to our current injection operations.

In addition, CRC is actively evaluating feasible options at Elk Hills. We met with Division staff and answered their questions. We informed Division staff that we may be able to reduce a portion of the disposal into the Tulare Formation by pursuing other projects and that we will need their assistance to permit those projects, but we also made it clear that entirely abandoning the current disposal infrastructure at Elk Hills is not geologically or technically possible because there are no alternatives sufficient to accept all of the produced water at Elk Hills.

For example, your letter mentions disposing into the San Joaquin, Reef Ridge and Etchegoin formations. The San Joaquin Formation is an actively producing hydrocarbon zone that still produces dry gas (so it is not a candidate for a waterflood). The Etchegoin Formation is under waterflood in part, but expansion possibilities are limited because of the gas assisted gravity drainage production strategy used for most of the reservoir. The Reef Ridge formation is a shale formation. Its permeability is very low and effective porosity is nonexistent. It would require a substantial increase in the number of wells, each of which would require hydraulic fracturing in order to achieve even marginal injectivity. In other words, these formations are not feasible candidates for alternative disposal. However, as we informed Division staff, we have several improved or enhanced recovery projects in various stages of design and permitting that we would like to pursue, but they are not a complete, or even a substantial, replacement for water disposal into the Tulare Formation. We plan to continue meeting with Division staff to evaluate and expedite partial alternatives at the same time we pursue an update of the Elk Hills Tulare aquifer exemption.

We look forward to meeting with you on Thursday.

Very truly yours,

Stephen Anthony Reid  
Director of Technical Services